STATE OF SOUTH CAROLINA)

BEFORE THE
PUBLIC SERVICE COMMISSION
OF SOUTH CAROLINA

In the Matter of

Application of Duke Energy Carolinas, LLC for Approval of Decision to Incur Nuclear Generation Pre-Construction Costs

COVER SHEET

DOCKET NUMBER: 2007-440-E

(Please type or print)

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DOCKETING INFORMATION (Check all that apply)

☐ Emergency Relief demanded in petition ☐ Request for item to be placed on Commission's Agenda expeditiously

☒ Other: Direct Testimony of Janice Hager

INDUSTRY (Check one)

- ☒ Electric
- ☐ Electric/Gas
- ☐ Electric/Telecommunications
- ☐ Electric/Water
- ☐ Electric/Water/Telecom.
- ☐ Electric/Water/Sewer
- ☐ Gas
- ☐ Railroad
- ☐ Sewer
- ☐ Telecommunications
- ☐ Transportation
- ☐ Water
- ☐ Water/Sewer
- ☐ Administrative Matter
- ☐ Other:

NATURE OF ACTION (Check all that apply)

- ☐ Affidavit
- ☐ Agreement
- ☐ Answer
- ☐ Appellate Review
- ☐ Application
- ☐ Brief
- ☐ Certificate
- ☐ Comments
- ☐ Complaint
- ☐ Consent Order
- ☐ Discovery
- ☐ Exhibit
- ☐ Expedited Consideration
- ☐ Interconnection Agreement
- ☐ Interconnection Amendment
- ☐ Late-Filed Exhibit
- ☐ Letter
- ☐ Memorandum
- ☐ Motion
- ☐ Objection
- ☐ Petition
- ☐ Petition for Reconsideration
- ☐ Petition for Rulemaking
- ☐ Petition for Rule to Show Cause
- ☐ Petition to Intervene
- ☐ Petition to Intervene Out of Time
- ☐ Prefiled Testimony
- ☐ Promotion
- ☐ Proposed Order
- ☐ Protest
- ☐ Publisher's Affidavit
- ☐ Report
- ☐ Request
- ☐ Request for Certificatio
- ☐ Request for Investigatior
- ☐ Resale Agreement
- ☐ Resale Amendment
- ☐ Reservation Letter
- ☐ Response
- ☐ Response to Discovery
- ☐ Return to Petition
- ☐ Stipulation
- ☐ Subpoena
- ☐ Tariff
- ☒ Other:

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DIRECT TESTIMONY OF JANICE D. HAGER FOR DUKE ENERGY CAROLINAS

Q. PLEASE STATE YOUR NAME, ADDRESS, AND POSITION WITH DUKE ENERGY CORPORATION.

A. My name is Janice D. Hager. My business address is 526 South Church Street, Charlotte, North Carolina. I am Managing Director, Integrated Resource Planning and Environmental Strategy for Duke Energy Corporation's ("Duke Energy") operating utilities, including Duke Energy Carolinas, LLC ("Duke Energy Carolinas" or the "Company").

Q. WHAT ARE YOUR JOB RESPONSIBILITIES?

A. I have responsibility for integrated resource planning ("IRP") and environmental compliance planning for Duke Energy's regulated electric utilities. In that role, I oversee the long-term resource planning for Duke Energy's Carolinas and Midwest operations, as well as planning for environmental compliance. Duke Energy's long-range resource planning is conducted separately for each of the operating utilities.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I am a civil engineer, having received a Bachelor of Science in Engineering from the University of North Carolina at Charlotte. I began my career at Duke Power Company (now known as Duke Energy Carolinas) in 1981 and have had a variety of responsibilities across the Company in areas of piping analyses, nuclear station modifications, new generation licensing, and rates and regulatory affairs, including serving as Vice President, Rates and Regulatory Affairs for Duke

Energy Carolinas. I assumed my current position in January 2007. I am a registered Professional Engineer in South Carolina and North Carolina.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to discuss how the IRP process for the 2007 Duke Energy Carolinas Annual Plan, filed in Docket No. 2005-356-E, demonstrates that the Company should continue the development of the Lee Nuclear Station.

Q. PLEASE PROVIDE AN OVERVIEW OF THE INTEGRATED RESOURCE PLANNING PROCESS FOR THE DUKE ENERGY CAROLINAS 2007 ANNUAL PLAN.

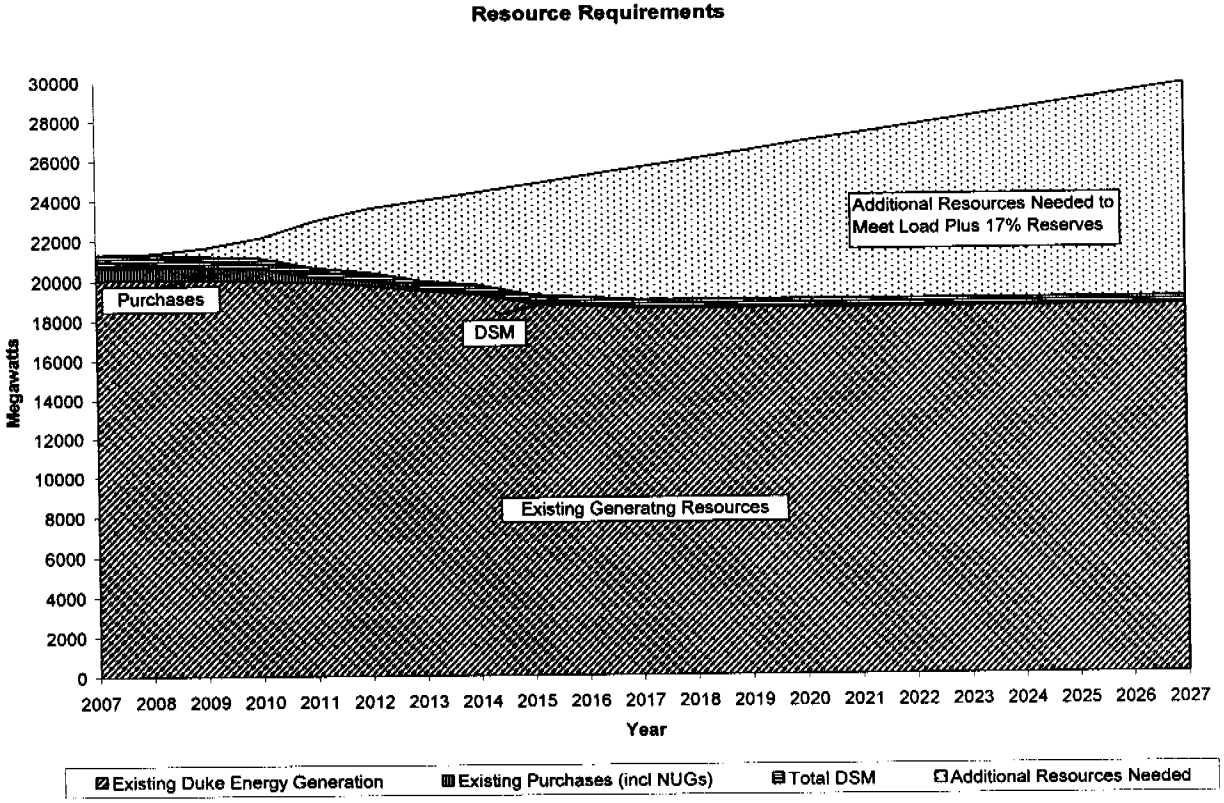
A. The annual planning process begins with a 20-year load forecast. The forecast includes projections of summer and winter peak demands, as well as energy use. Information is gathered for Duke Energy Carolinas' existing resources, including Company-owned generation, purchased power agreements, and demand-side/energy efficiency resources. The information includes items such as capacity rating, heat rate, fuel costs and emission allowance costs. Data is gathered on the costs of additional resource options to meet customer needs. Such data includes lead times for construction, capacity costs, fixed and variable operating and maintenance costs and emissions costs for generation, as well as the costs of demand-side options. Quantitative analyses are conducted to identify combinations of options that will meet customer energy needs (plus reserve margin) while minimizing the costs to customers. The 2007 Annual Plan incorporates a target planning reserve margin of 17%, which Duke Energy Carolinas' historical experience has shown to be sufficient based on the prevailing expectations of reasonable lead times for the development of

new generation, siting of transmission facilities and procurement of purchased capacity. These quantitative analyses enable the Company to identify potential portfolios that can be tested under base assumptions, and for sensitivities and scenarios around those base assumptions.

Q. WHAT ADDITIONAL SYSTEM RESOURCE NEEDS DID THE ANNUAL PLAN IDENTIFY OVER THE PLANNING HORIZON?

A. The current load forecast reflects a 1.6 percent average annual growth in summer peak demand, and a 1.4 percent average annual growth in winter peaks and total energy usage. These percentages equate to an average annual growth rate of approximately 350 MWs per year of energy and 1,500,000 megawatt-hours per year. In addition, we have some existing resources that will no longer be available to meet our customers' needs. Each MW of capacity that is no longer available must be replaced with new capacity, either from supply-side or demand-side resources. Hager Graph 1 and Hager Table 1 below show the existing resources and resource requirements to meet the load obligation, plus the 17 percent target planning reserve margin. Beginning in 2007, existing resources, consisting of existing generation, DSM, and purchased power to meet load requirements, total 21,330 MW. The load obligation plus the target planning reserve margin is 20,907 MW, indicating sufficient resources to meet Duke Energy Carolinas' obligation through 2008. The need for additional capacity grows over time due to load growth, unit capacity adjustments, unit retirements, existing DSM program reductions, and expirations of purchased-power contracts. The need grows to approximately 7,000 MW by 2018 and to 10,700 MW by 2027.

Hager Graph 1
Load/Resource Balance



Hager Table 1
Cumulative Resource Additions to Meet A 17 Percent Planning Reserve Margin

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Resource Need	0	60	430	990	2,340	3,190	4,030	4,630	5,540	6,090
Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Resource Need	6,620	7,020	7,430	7,880	8,270	8,670	9,070	9,470	9,880	10,280

Q. WHAT ARE THE KEY ISSUES OR UNCERTAINTIES THAT WERE CONSIDERED IN THE 2007 ANNUAL PLAN?

A. A few of the key uncertainties include, but are not limited to:

- Load Forecasts: How elastic is the demand for electricity? Will environmental regulations such as carbon costs result in higher costs of electricity and, thus, lower electricity usage? Can a highly successful energy efficiency program actually flatten or even reduce demand growth?
- Nuclear Generation: Is the region ready for a nuclear revival? What is the timeframe needed to license and build nuclear plants? What level of certainty can be established with respect to the capital costs of a new nuclear power plant?
- Carbon Costs: What type of carbon legislation will be passed? Will it be industry-specific or economy-wide? Will it be a "cap-and-trade" system? How will allowances be allocated? Will there be a "safety valve" on allowance prices?
- Renewable Energy: Will utilities be able to secure sufficient renewable resources to meet renewable portfolio standards? Will a federal standard be set? Will it have a "safety valve" price?
- Demand-Side Management ("DSM") and Energy Efficiency ("EE"): Can DSM and EE deliver the anticipated capacity and energy savings reliably? Are customers ready to embrace energy efficiency? Will an investment in Demand-Side Management and Energy Efficiency be treated equally with investments in a generating plant?
- Building Materials Availability and Cost: Will the worldwide demand for building materials and equipment continue to cause significant price increases and lengthened delivery times? Is this an aberration or a long-term trend?

- Gas Prices: What is the future of natural gas prices and supply? Will Liquified Natural Gas (LNG) facilities come to fruition as envisioned?

Duke Energy Carolinas' resource planning process seeks to identify what actions the Company must take to ensure there is a safe, reliable, reasonably-priced supply of electricity regardless of how these uncertainties unfold. As a result, Duke Energy Carolinas' 2007 IRP analysis considered two scenarios: a Reference Case without carbon dioxide ("CO_2") regulation (the "Reference Case"); and a Carbon Case with CO_2 regulation and a Renewable Portfolio Standard (the "Carbon Case"). The comprehensive planning process considers a wide range of assumptions and uncertainties and develops an action plan that preserves the options necessary to meet customers' needs.

Q. ARE DECISIONS REGARDING RESOURCE PLANNING MADE ON THE BASIS OF QUANTITATIVE ANALYSES ALONE?

A. No. Consistent with the responsibility to meet customer energy needs in a reliable and economic manner, the Company's resource planning approach includes both quantitative analysis and qualitative considerations. Quantitative analysis provides insights on the potential impacts of future risks and uncertainties associated with fuel prices, load growth rates, capital and operating costs, and other variables. Qualitative perspectives such as the importance of fuel diversity, the Company's environmental profile, the stage of technology deployment, and regional economic development are also important factors to consider as long-term decisions are made regarding new resources.

Company management uses all of these perspectives and analyses to ensure that Duke Energy Carolinas will meet near-term and long-term customer needs, while maintaining flexibility to adjust to evolving economic, environmental, and operating circumstances in the future. The environment for planning the Company's system has never been more dynamic. As a result, the Company believes prudent planning for customer needs requires a plan that is robust under many possible future scenarios, and maintains a number of options to respond to many potential outcomes of major planning uncertainties (e.g., federal greenhouse gas emission legislation).

Q. GIVEN THE ANALYSIS CONDUCTED WITH THESE CONSIDERATIONS IN MIND, WHAT WERE THE CONCLUSIONS OF THE 2007 ANNUAL PLAN?

A. The quantitative analyses suggest that a combination of additional base load, intermediate and peaking generation, renewable resources, EE, and DSM programs is required over the next twenty years to meet customer demand reliably and cost-effectively. The optimal resource mix is different under different sensitivities. For example, if an assumption is made that there is no carbon regulation on the planning horizon, portfolios without nuclear look best. If an assumption is made assuming carbon regulation with CO_2 allowances at safety-valve prices, portfolios with one nuclear unit perform well. If higher CO_2 allowance prices are assumed, portfolios with two nuclear units are cost-beneficial to customers. The analyses performed did not include the potential

value of production tax credits for the nuclear alternatives, which would improve the relative economics of portfolios with nuclear units.

Under the Reference Case, the portfolio consisting of 3,100 MW of new natural gas combined cycle capacity, 4,052 MW of new natural gas combustion turbine capacity, 1,117 MW of new nuclear capacity, 1,016 MW of Demand-Side Management, and 790 MW of Energy Efficiency was selected. Under the Carbon Case, the portfolio consisting of 1,240 MW of new natural gas combined cycle capacity, 3,560 MW of new natural gas combustion turbine capacity, 1,117 MW of new nuclear capacity, 1,016 MW of Demand-Side Management, 790 MW of Energy Efficiency, and 1,135 MW of renewable resources was selected. The selected portfolios in both Reference Case and Carbon Case also include the new 800 MW advanced clean coal Cliffside Unit 6 and approximately 1,000 MW of older coal unit retirements and approximately 500 MW of older gas/oil unit retirements.

Q. SPECIFICALLY, WHAT DID THE 2007 ANNUAL PLAN CONCLUDE AS TO NEED FOR AND TIMING OF NEW NUCLEAR GENERATION?

A. The IRP screening results demonstrate that the optimal timing of new nuclear varies from 2016 to 2023, depending on assumptions. As a result, a 2018 date was used for modeling purposes and the actual planned operational date may be accelerated or delayed as additional information becomes available. Significant challenges and uncertainties remain, however, in obtaining the resources required to meet customer needs. Issues such as obtaining the necessary regulatory approvals to implement the DSM, EE, and supply-side resources, finding sufficient cost-effective, reliable

renewable resources to meet the newly-enacted North Carolina renewable energy and energy efficiency portfolio standard (and any federal standard which may be adopted), integrating renewables into the resource mix, and ensuring sufficient transmission capability for these resources must all be addressed. Because of these issues and uncertainties, Duke Energy Carolinas' action plan includes actions that go beyond a single portfolio plan. For example, because of the possibility that CO_2 allowance prices may be higher than estimated in the base Carbon Case, the action plan includes licensing for two nuclear units. While the Company's plan is the most appropriate resource plan at this point in time, good business practice and prudent planning require that Duke Energy Carolinas continue to study the options, and make adjustments as necessary and practical to reflect improved information and changing circumstances.

Q. DID DUKE ENERGY CAROLINAS CONSIDER ENERGY EFFICIENCY AND DEMAND-SIDE RESOURCES IN THE 2007 ANNUAL PLAN?

A. Yes, the options considered for the 2007 Annual Plan grew out of Duke Energy Carolinas' heightened emphasis on DSM/EE in collaboration with our customers. In 2006, Duke Energy Carolinas established EE and DSM-related collaborative groups, consisting of stakeholders from across its service area, and charged them with recommending a new set of EE and DSM-related programs for the Company's customers. Collaborative efforts to date have been very productive, resulting in the Company's September 28, 2007, South Carolina Energy Efficiency filing in Docket No. 2007-358-E, which this Commission recently heard testimony on during its February 5-6, 2008 hearing, as well as the May 7, 2007 North Carolina Energy

Efficiency filing in NCUC Docket No. E-7, Sub 831. These Energy Efficiency filings propose implementation of approximately 1,865 MW and 743 GWh of DSM across South Carolina and North Carolina by 2011. This work was incorporated into the 2007 process as follows. The costs and impacts included in Duke Energy Carolinas' DSM/EE Application (excluding pilot programs) were modeled and the assumption was made that these costs and impacts would continue throughout the planning period. The DSM programs were modeled as two separate "bundles" (one bundle of Non-Residential programs and one bundle of Residential programs) that could be selected based on economics. The EE programs were modeled as three separate bundles that could be selected based on economics. Bundle 1 corresponded to the costs and impacts for EE programs included in Duke Energy Carolinas' DSM/EE filing for 2008 through 2012. From years 2013 through 2027 it was assumed that the measures would be replaced in kind (with associated costs) such that there would be no decline in the impacts over time (i.e., continuous commissioning of impacts). Bundles 2 and 3 were modeled identically to Bundle 1, but they were not allowed to start until 2012 and 2016, respectively, and their costs utilized the costs of Bundle 1 escalated at the rate of inflation. In addition, the modeling included a 1 MW EE program based on the $2,000,000 program required by the NCUC order in Docket E-7, Sub 795.

For IRP purposes, we assumed that the ramp up of EE to reach that level of energy savings included in the EE Application would continue through 2020. Thus, the Company has included in the 2007 IRP the level of EE that the independent market potential study believes is reasonably achievable over the near term and

includes an assumption that this rate of achievement will continue over time. The 2007 Annual Plan includes 1,016 MW of DSM and 790 MW of EE.

Q. DID DUKE ENERGY CAROLINAS CONSIDER RENEWABLE ENERGY RESOURCES?

A. Yes. Because of North Carolina's recent enactment of a Renewable Energy and Energy Efficiency Portfolio Standard, Duke Energy Carolinas modified its consideration of renewable energy resources. In previous annual plans, resources were screened on economics. Therefore, renewable resources were screened out due to their higher cost than traditional supply-side resources. In the 2007 Annual Plan, renewable resources were screened separately to identify the most cost-effective resources among the renewable options. For the Carbon Case with CO_2 regulation, the Renewable Portfolio Standard assumptions are based on recently-enacted legislation in North Carolina. The assumptions for planning purposes are as follows:

<u>Overall Requirements/Timing</u>

- 3% of 2011 load by 2012
- 6% of 2014 load by 2015
- 10% of 2017 load by 2018
- 12.5% of 2020 load by 2021

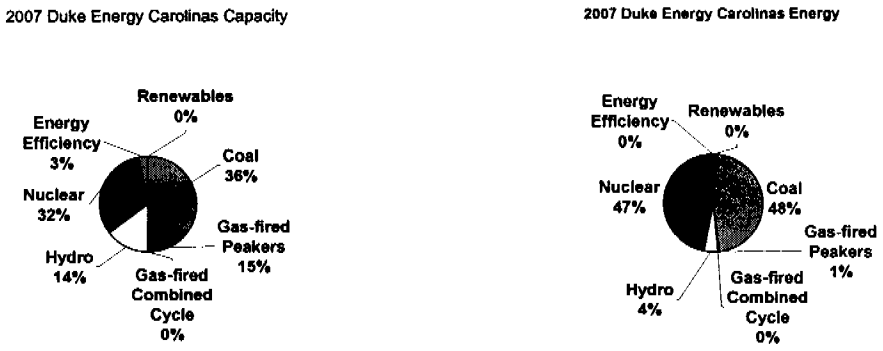
A portion of the Renewable Portfolio Standard requirements also was assumed to be provided by EE, co-firing biomass in some of Duke Energy Carolinas' existing units, and by purchasing Renewable Energy Certificates from out of state, as allowed in the legislation. These requirements were applied to all native loads served by Duke Energy Carolinas (i.e., both retail and wholesale, and regardless of the location of the load) to take into account the potential that a Federal Renewable

Portfolio Standard may be imposed that would affect all loads. The 2007 Annual Plan includes 160 MW of renewable energy by 2012 and approximately 1,000 MW by 2020.

Q. PLEASE DESCRIBE DUKE ENERGY CAROLINAS' EXISTING GENERATION RESOURCE PORTFOLIO MIX.

A. Duke Energy Carolinas' generation portfolio is composed of over 21,000 MWs of generation capacity. As shown on the charts below in Hager Graph 2, while Duke Energy Carolinas' capacity mix is roughly one-third coal, one-third nuclear, and one-third hydroelectric and gas-fired, the energy mix is roughly 50% nuclear and 50% coal-fired generation.

Hager Graph 2



Q. HOW DOES BUILDING ADDITIONAL NUCLEAR GENERATION AFFECT THE DIVERSITY OF THE PORTFOLIO?

A. As noted above, Duke Energy Carolinas is planning on adding significant amounts of renewable and DSM/EE resources. Even with these efforts which would add 1,100 MW of additional DSM/EE and 1,100 MW of renewable energy,

as well as the addition of the 800 MW new advanced clean coal Cliffside unit, significant generation resources are needed to meet customer demands. If additional nuclear or coal capacity is not added, the only feasible generation alternative is natural gas-fired generation. The addition of the Lee Nuclear Station will mean less dependence on natural gas or coal-fired generation. The continued development of Lee Nuclear would allow for continued diversification of resources, which is a benefit to all customers.

Q. IN CONCLUSION, WHY IS THE CONTINUED DEVELOPMENT OF THE LEE NUCLEAR STATION IMPORTANT TO DUKE ENERGY CAROLINAS' FUTURE RESOURCE PLANNING?

A. The Lee Nuclear Station would provide needed, reliable, and greenhouse gas emission-free base load generation for Duke Energy Carolinas. Given the uncertainties posed by future economic, environmental, regulatory, and operating circumstances, continuing to develop new nuclear generation as a resource option in the 2018 timeframe is prudent because the IRP analysis demonstrates that the Lee Nuclear Station has significant value for customers under multiple scenarios. For all the reasons stated previously, I believe that Duke Energy Carolinas' decision to incur continued development costs for the Lee Nuclear Station is reasonable and ask that the Commission approve the Company's application.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes, it does.